AS 5339:2019
ISO 3747:2010

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Australian
STANDARD

Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use *in situ* in a reverberant environment

STANDARDS
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Association of Australasian Acoustical Consultants
Australian Acoustical Society
Austroads
Bureau of Steel Manufacturers of Australia
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Engineers Australia
Master Builders Australia
University of Sydney

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Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EV-010, Acoustics Community Noise.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify a method for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by a noise source (machinery or equipment) mounted *in situ* in a reverberant environment, with those from a calibrated reference sound source. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one octave, is calculated using those measurements. The sound power level or sound energy level with frequency A-weighting applied is calculated using the octave-band levels.

This Standard is identical with, and has been reproduced from, ISO 3747:2010, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering/survey methods for use in situ in a reverberant environment.*

As this document has been reproduced from an International Standard, the following applies:

(a) In the source text "this International Standard" should read "this Australian Standard".

(b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3747 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This third edition cancels and replaces the second edition (ISO 3747:2000), which has been technically revised.

Introduction

This International Standard is one of the series ISO 3741[2] to ISO 3747, which specify various methods for determining the sound power levels and sound energy levels of noise sources including machinery, equipment and their sub-assemblies. The selection of one of the methods from the series for use in a particular application depends on the purpose of the test to determine the sound power level or sound energy level and on the facilities available. General guidelines to assist in the selection are provided in ISO 3740[1]. ISO 3740[1] to ISO 3747 give only general principles regarding the operating and mounting conditions of the machinery or equipment for the purposes of the test. It is important that test codes be established for individual kinds of noise source, in order to give detailed requirements for mounting, loading, and operating conditions under which the sound power levels or sound energy levels are to be obtained.

The method given in this International Standard is based on a comparison of the sound pressure levels in octave frequency bands of a noise source under test with those of a calibrated reference sound source; A-weighted sound power levels or sound energy levels may be calculated from the octave-band levels. The method is applied where the noise source is found *in situ* and as such is suitable for larger pieces of stationary equipment which, due to their manner of operation or installation, cannot readily be moved.

The method specified in this International Standard permits the determination of the sound power level and the sound energy level in octave bands from which the A-weighted value is calculated.

This International Standard describes a method giving results of either ISO 12001:1996, accuracy grade 2 (engineering grade) or ISO 12001:1996, accuracy grade 3 (survey grade), depending on the extent to which the requirements concerning the test environment are met. For applications where greater accuracy is required, reference can be made to ISO 3741[2], ISO 3744[5] or an appropriate part of ISO 9614[17]-[19]. If the relevant criteria for the measurement environment specified in this International Standard are not met, it might be possible to refer to another standard from this series, or to an appropriate part of ISO 9614[17]-[19].

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1 Scope

1.1 General

This International Standard specifies a method for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by the noise source (machinery or equipment) mounted *in situ* in a reverberant environment, with those from a calibrated reference sound source. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one octave, is calculated using those measurements. The sound power level or sound energy level with frequency A-weighting applied is calculated using the octave-band levels.

1.2 Types of noise and noise sources

The method specified in this International Standard is suitable for all types of noise (steady, non-steady, fluctuating, isolated bursts of sound energy, etc.) defined in ISO 12001. The method is primarily applicable to sources which emit broad-band noise. It can, however, also be used for sources which emit narrow-band noise or discrete tones, although there is a possibility that the measurement reproducibility is then degraded.

The noise source under test can be a device, machine, component or sub-assembly, especially one which is non-movable.

1.3 Test environment

The test environment that is applicable for measurements made in accordance with this International Standard is a room where the sound pressure level at the microphone positions depends mainly on reflections from the room surfaces (see 4.1). In measurements of ISO 12001:1996, accuracy grade 2 (engineering grade), background noise in the test environment is low compared to that of the noise source or reference sound source (see 4.2).

1.4 Measurement uncertainty

Information is given on the uncertainty of the sound power levels and sound energy levels determined in accordance with this International Standard, for measurements made in octave bands and for A-weighted frequency calculations performed on them. The uncertainty conforms with that of either ISO 12001:1996, accuracy grade 2 (engineering grade) or ISO 12001:1996, accuracy grade 3 (survey grade), depending on the extent to which the requirements concerning the test environment are met.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 6926, *Acoustics — Requirements for the performance and calibration of reference sound sources used for the determination of sound power levels*